ISO-C1®/2.5 Polyisocyanurate Insulation

2.5 lb/ft³ (40 kg/m³) density

ISO-C1®/2.5

ISO-C1/2.5 is Dyplast Products' 2.5 lb/ft³ polyisocyanurate rigid, closed cell, foam insulation. ISO-C1/2.5 is certified by independent laboratory to meet not only ASTM C591 but also the latest CINI standards. ISO-C1/2.5 is ideally suited for low temperature piping and refrigeration applications where added thermal performance, compressive, shear, flexural, or tensile strength beyond that available in 2.0 lb/ft³ polyiso is appropriate. Dyplast Products offers ISO-C1/2.5 as variable-sized bunstock or as sheets and blocks with tolerances to $^{1}/_{32}$ inch. Our extensive network of fabricators can provide special shapes for pipe, fittings, vessels, or other mechanical applications.

Polyisocyanurate exhibits the highest R-factor (insulating value) to thickness ratio of commercially available insulation, and our ISO-C1 product line provides higher R-factors and reduced thermal aging at lower temperatures. Ideal for low-temperature and cryogenic applications, ISO-C1 offers superior performance when compared to polystyrene, polyurethane, phenolic, fiberglass, and cellular glass alternatives. Our ISO-C1 product line is also available in 2, 3, 4, and 6 lb/ft³ densities, which each provide successively improved strength and other attributes such as ISO-HT for higher temperature applications.

ISO-C1/2.5 is produced as a continuous foam bunstock with the ability to custom size the bun in order to provide for customer fabrication to virtually any shape or size while reducing waste. For specific standard stock bun sizes contact the sales department at 1-800-433-5551 or logon to our website for ISO-C1 sizing. Our proprietary production process utilizes hydrocarbon blowing agents creating a portfolio of ISO-C1 products with physical properties superior to prior generation formulations.

APPLICATIONS

ISO-C1/2.5 is designed for use where temperatures range from -297F to +300F, making it ideal for refrigeration and freezers, commercial HVAC and chill water systems, cryogenic processes such as LNG and LOX, panel insulation for transportation containers, duct and air plenum insulation, and core material for architectural and panel construction.

WATER ABSORPTION

ISO-C1/2.5 has an exceptional WA of "zero" per ASTM D2842, the test method required by CINI (the International Standard for Industrial Insulation). It also has excellent resistance to water absorption (0.27%) per ASTM C272, the test method required by ASTM C591, helping ensure long-term thermal performance superior to polystyrenes, phenolic foams, fiberglass, and even cellular glass. Note WA measurements per D2842 require a 96 hour immersion period, and per ASTM C272 a 24 hour period. The comparable cellular glass test per ASTM C240 requires a 2 hour immersion.

SURFACE BURNING CHARACTERISTICS

The International Mechanical Code defines Class 1 insulation as meeting the 25/450 flame spread/smoke development rating. ISO-C1/2.5 performs well within this range with a 25/350 rating. When comparing surface burning characteristics of alternative products, care must be taken to consider the installed insulation system as a whole, including sprinkler systems. For example, a well-designed ISO-C1 insulation system can improve overall fire/smoke performance of the polyiso insulation. On the other hand, an alternative insulation's fire/smoke ratings may be compromised by the sealants or jacketing often recommended by suppliers. There is also the matter of insulation system integrity during a fire. ISO-C1/2.5 may be charred by flame, but maintains its integrity and continues to protect the insulated system.

LONG TERM R-FACTOR

High thermal insulation efficiency is achieved by infusing cells with gases having low thermal conductivity. All such rigid foam insulation (including polyurethane, extruded polystyrene, and polyisocyanurate) thus lose a small amount of their insulating value over time as air displaces insulating gases. ISO-C1/2.5's smaller, stronger cell structure and our proprietary cell-gas formulation work together to impede gas transfer across cell boundaries, thus reducing loss of thermal efficiency. At a testpoint of 75F, the average R-factor of ISO-C1/2.5 over a 15 year period is comparable to the six-month "aged" R-factor. It is important to note that ISO-C1/2.5's service temperatures are normally well below 75F, and that thermal aging is reduced considerably at lower operating temperatures. Thicker insulation, vapor barriers, and metal constraints also limit gas diffusion. Existing Long Term Thermal Resistance calculation standards are not accurate for ISO-C1/2.5 bunstock, particularly as-installed in low temperature applications.

NOTE TO ENGINEERS AND CONTRACTORS

Visit www.dyplast.com for easily accessible information on specifications as well as installation, MSDS, and more. Relevant documents are retrievable within two clicks from our home page.

ISO-C1®/2.5 POLYISOCYANURATE INSULATION (nominal 2.5 lb density)

DYPLAST products

ISO-C1®/2.5 Polyisocyanurate Foam Comparison versus ASTM C591-17

GENERAL PHYSICAL PROPERTIES	ISO-C1/2.5	ASTM C591 Max or Min
Service Temperature (Maximum), °F (°C)	300 (149)	300 (149)
(Minimum)	-297 (-183)	-297 (-183)
12.1 Nominal Density, D1622, lb/ft^3 (kg/m^3)	2.5 (40)	≥2.5 (40)
12.2 Compressive Resistance (Strength), D1621, psi (kPa)		
Parallel	41.4 (285)	≥35 (241)
Perpendicular (Length)	33 (230)	Not specified
Perpendicular (Width)	30 (207)	Not specified
12.3 Apparent Thermal Conductivity, C177 (aged 6 months @ 73 ± 4°F), Btu·in/hr·ft^2·°F (W/m·°K)		
Mean temp of measure -265°F (-165°C)	0.084 (0.012)	Not specified
Mean temp of measure -200°F (-129°C)	0.116 (0.017)	≤0.13 (0.019)
Mean temp of measure -150°F (-101°C)	0.137 (0.020)	≤0.15 (0.022)
Mean temp of measure -100°F (-73°C)	0.158 (0.023)	≤0.17 (0.025)
Mean temp of measure -50°F (-45°C)	0.178 (0.026)	≤0.19 (0.027)
Mean temp of measure -0°F (-17°C)	0.188 (0.027)	≤0.20 (0.029)
Mean temp of measure +50°F (+10°C)	0.183 (0.026)	≤0.19 (0.027)
Mean temp of measure +75°F (+24°C)	0.191 (0.028)	≤0.20 (0.029)
Mean temp of measure +150°F (+66°C)	0.229 (0.033)	≤0.24 (0.035)
Mean temp of measure +200°F (+93°C)	0.257 (0.037)	≤0.27 (0.039)
Apparent Thermal Conductivity, C518, aged +75F (+24C)	0.186 (0.027)	≤0.20 (0.029)
12.4 Hot-Surface Performance, C411, at 300°F (149°C) Deflection inches (mm)	Pass @ 0.09 (2)	≤0.25 (6)
12.5 Water Absorption, C272, % by volume	0.27	≤1.0
12.6 Water Vapor Permeability (Transmission), E96, Perm-in (ng/Pa·s·m)	1.93 (2.8)	≤3.5 (5.1)
12.7 Dimensional Stability, D2126, % linear change		
-40°F, 14 days	0.6	≤1
158°F, 97% RH, 14 days	-1.6	≤4
212°F, 14 days	-0.5	≤2
12.8 Closed Cell Content, D6226, %	97	≥90
Meets ASTM C591-17	YES	YES

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ISO-C1®/2.5 POLYISOCYANURATE INSULATION: (2.5 lb/ft³ density)

DYPLAST® products

The following properties are NOT Specified for ASTM C591 but are often reported

	Test Method	Units	ISO-C1®/2.5
Surface Burning Characteristics (if requi	ASTM E84		
Flame Spread (@4" thickness)			**≤25**
Smoke Density (@4" thickness)			**350**
Leachable Chloride	ASTM C871	ppm	**58**
Shear Strength	ASTM C273	psi	
Average of 3 directions			**24**
Shear Modulus	ASTM C273	psi	**289**
Tensile Strength	ASTM D1623	psi	
Parallel			**49**
Perpendicular			**35**
Tensile Modulus	ASTM D1623	psi	
Parallel			**1741**
Perpendicular			**1167**
Flexural Strength	ASTM C203	psi	
Parallel			**58**
Perpendicular			**60**
Flexural Modulus	ASTM C203	psi	
Parallel			**870**
Perpendicular			**1018**
Coefficient of Linear Expansion	ASTM E228	in/in.°F	
Average Value			**34×10^{-6}**
Color			**Tan**

CONDENSATION

For optimum performance and longevity, insulation systems for low temperature applications must be designed to control condensation. One primary design strategy is to specify high insulation efficiency since if the surface temperature of the insulation system can be maintained above the dewpoint, condensation will not occur. Since a minimal amount of condensation may be acceptable (or unavoidable) in humid environments, a secondary design strategy is to also demand insulation with low water vapor transmission. In this regard, no other insulation alternative offers ISO-C1/2.5's combination of superior R-value and low water vapor permeance.

FEATURES AND BENEFITS

- Fabrication available to virtually any shape/size
- Variable bunstock sizing in 3 dimensions
- Environmentally friendly (Zero-ODP)
- Sheets can be cut to 1/32" tolerance
- Easy to handle, shape in the field
- Excellent Moisture Resistance
- Superior insulating value
- High flexural strength
- Dimensionally stable
- Chemically resistant
- Low life-cycle cost
- Light-weight

THERMAL EFFICIENCY

With its high R-value, ISO-C1/2.5 can achieve the same insulating value with as little as half the thickness required by alternative insulating materials. Less insulation leads to thinner walls, more space, and fewer and tighter energy-losing seams - - further enhanced by the availability of larger pieces (for example, 24-foot lengths). Less insulation in mechanical applications also equates to reduced quantities of expensive vapor retarders, jackets, and mastics. The lighter weight of ISO-C1/2.5 compared to cellular glass (roughly one-third) reduces structural support requirements.

LIMITATIONS AND DISCLAIMER OF WARRANTIES AND LIABILITIES

Dyplast Products, LLC ("Dyplast") warrants that all products manufactured and sold by us are free from defects in material and workmanship at the time of shipment. Dyplast shall be notified promptly of any material claimed defective and such materials shall be subject to inspection by Dyplast. With respect to material proven to be defective, Dyplast will replace any material; replacement will be CIF to the buyer's location. This warranty is given in lieu of all other warranties expressed or implied, including without limitation any warranty of merchantability or fitness for a particular purpose and all other such warranties are expressly disclaimed. In no event shall Dyplast be liable, under this warranty for special, incidental, punitive or inconsequential damages of any kind whatsoever arising from the use or installation of the materials sold hereunder, and Dyplast's liability under the above warranty shall be expressly limited to the cost of those materials proven to be defective. In no event, whether as a result of breach of contract, warranty or alleged negligence shall Dyplast be liable for damages for lost profits or revenue, claims of Dyplast's customer's or their customer's inability to operate their facilities, or any other item of special incidental, punitive or consequential damages.

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